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AUTHOR Thornton, L. Jay: And Others
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IDENTIFIERS SQ4R Method

ABSTRACT

Trade and Industrial Reading Strategies is one of five instructional guides in the Reading Strategies in Vocational Education Series. Developed to assist teachers working with students considered disadvantaged because of reading deficiency, the guide contains several strategies, suitable for adaptation, specifically related to trade and industrial education. Each of six sections into which the guide is divided contains informational material and extensive examples and exercises. Section 1 concerns readability and gives procedures and guidelines for collecting samples and how many to collect. Section 2 briefly describes the Cloze procedure and its usefulness as a reading test and as a teaching technique for the theory of case grammar. The following four sections each present a set of important reading skills: Basic Vocabulary Skills, Paragraph Comprehension, SQ4R (Survey, Question, Read, Record, Recite, Review), and Recognizing and Recording Complex Information. Each skill is broken down into segments requiring no more than 5-10 minutes of class time every other day. Homework utilizes text assignments normally required. Following individual skill discussions is the part, Textbook Application, where each skill is applied to the course's own textbook. Each section ends with additional suggestions for teaching the new skills. (A time frame is provided for teaching the skills.) (YLB)

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TRADE AND INDUSTRIAL READING STRATEGIES

L. Jay Thornton
Instructor and Project Director

Louise Bay Waters
Reading Consultant

Ta-Wei Lee
Project Associate

Division of Occupational and Vocational Studies
The Pennsylvania State University

Pennsylvania Department of Education
Bureau of Vocational Education

1980

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

FORWARD

Education amendments in 1976 (P.L. 94-482) provide for special assistance to a wide variety of students with "special needs." The special needs of these students are derived from conditions of the students which are believed to inhibit success in vocational programs. Both handicapped and disadvantaged individuals are to be served by the legislative provisions.

Academically disadvantaged students are those individuals who, because of math, reading, or communication deficiencies, may not be able to succeed in vocational programs. Legislation has provided for research and development projects to address the needs of these individuals. The projects in progress have been designed to respond to that call for research and development.

This instructional guide was developed for the purpose of assisting Trade and Industrial Teachers in their work with students who are considered disadvantaged because of reading deficiency. It was developed as a result of vocational reading research at The Pennsylvania State University. The guide is intended to be presented at workshops in 1980 funded by the Pennsylvania Department of Education.

"Trade and Industrial Reading Strategies" have been developed according to certain distinct characteristics of reading requirements in vocational education:

(1) Reading is a vocational skill, one that requires reading abilities that differ from those associated with general literacy.

(2) There is a difference between curricular literature (textbooks and other literature which must be read in the context of student status) and occupational literature (manufacturers instructions, codes, specifications, safety warnings, etc.).

(3) Occupational reading skills are appropriately addressed in the vocational curriculum.

(4) There are strategies available to vocational teachers which need little or no reading specialization.

(5) Available strategies reflect the unique qualities of vocational reading, address general vocational reading skill requirements, and are useful for helping students disadvantaged because of reading deficiencies.

This guide is NOT intended to be envisioned as the final word in reading strategies. It contains examples of several strategies believed to be useful for the vocational instructor seeking methods that are specifically related to trade and industrial education. The instructors are responsible for taking these examples and applying them to their occupational specialties. Not all of the methods will work for all T & I teachers or their

respective students. The methods were designed to be adapted, not rigidly adhered to.

Companion R & D projects at Penn State will provide useful complementary aids. An Employability Skills Curriculum Guide (Wircenski, McPherson, Feng, 1980) will soon be available. That guide addresses socialization, financial management, values clarification, job procurement, and communication skills. Five occupational specialties (Carpentry, Cosmetology, Data Processing, Medical Assisting, and Radio and Television) will be the bases for reading strategy guides (Thornton, 1980). These guides will focus more specifically on the individual occupational areas utilizing a format similar to the T & I guide.

Field testing during 1980-81 school year is expected to result in additional refinements of the several reading strategies. Criticism and recommendations are invited by all who receive these materials. Correspondence should be addressed to

Director
Reading Intervention Strategies Project
113 Rackley Building
The Pennsylvania State University
University Park, PA 16802

L. Jay Thornton
Project Director
1980

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The Reading Strategies in Vocational Education Series, of which this book is one part, has resulted from research conducted by the Division of Occupational and Vocational Studies, The Pennsylvania State University and the Bureau of Vocational Education, Pennsylvania Department of Education. Many people, not expressly identified as part of the project, have served willingly in the dispatch of its objectives. Appreciation is especially expressed to Mr. Wayne Grubb, Consultant for Disadvantaged and Handicapped, Bureau of Vocational Education, Pennsylvania Department of Education, for his support and procedural advice.

Seventeen Area Vocational-Technical Schools in the Center Region of Pennsylvania participated in the development of the series. Scores of manufacturers, publishers, and employers provided literature and information. A listing of the schools, manufacturers, publishers, and employers follows. The project would have been impossible without their help.

Two research efforts provided considerable information toward the development of the series. The first, Basic Reading Skills and Vocational Education, was published by The National Center for Research In Vocational Education under the auspices of the Knowledge Transformation Project. That publication was supervised by Dr. Carol P. Kowle. The second, Review and Synthesis

of Reading In Vocational Education, was published by the Division of Occupational and Vocational Studies in conjunction with the Division of Education Administration Policy Studies and The Pennsylvania Department of Education. Both titles are available directly from their respective publishers.

Appreciation is expressed to Mrs. Laura Frye for her careful attention to the typing and proofreading of not only the final drafts of each title in the series, but all the preliminary work and intervening drafts required.

DISCLAIMER

The activity which is the subject of this report was supported in whole or in part by the U. S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.

LIST OF PARTICIPATING SCHOOLS

Altoona AVTS

Centre County AVTS

Clearfield County AVTS

Columbia-Montour AVTS

Dauphin County AVTS

Franklin County AVTS

Juniata-Mifflin County AVTS

Lancaster AVTS - Mt. Joy

Lebanon County AVTS

SUN AVTS

Northumberland County AVTS

York County AVTS

Carlisle Area School District

Danville Senior High School (Nursing)

Hanover Public School District (Nursing)

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SECTION 1
READABILITY

In order to plan for intervening in situations of reading deficiency, several pieces of information are required. First, it must be known how urgent the need to read really is, in the context of both curriculum and occupational requirements. This does not suggest that reading, in the general literacy sense, may not be important. Educators clearly recognize that reading ability is crucial if learning is to occur. What this first question addresses is an examination of objectives and their component tasks to ascertain how much reading is required to complete the tasks and, ultimately, the objectives of the course.

Although there has been no research to date to distinguish between curricular and occupational reading requirements (Reference Note[1]) it is not difficult to visualize differences between textbook reading and, for example, manufacturers maintenance manuals. When Willis Wagner in his carpentry text (1973) directed students to "follow directions listed in manufacturers manual" (regarding tools), it was intended that the student of carpentry read this literature. That directive identifies two kinds of reading: that which is required to read the Wagner textbook (curricular) and that required to read the manufacturer's instructions (occupational). Previous research (De. W. Smith, 1974; Thornton, 1977; Thornton, 1979; Thornton, 1980) suggests that there could be significant differences in the readability level of sections of textbooks dealing with specific tasks and the readability level of literature pertaining to the performance of those tasks.

It is a fact that reading literature peculiar to an occupational specialty at least implies that some form of reading is a vocational skill. Thus, the second bit of information must be collected. It must be known (or decided) if the teacher, the school, and the school district intend to address reading within the vocational curriculum or as prerequisite skill. If reading is to be dealt with in the vocational curriculum, then all students must receive some form of vocational reading instruction. If, however, reading skill is envisioned to be prerequisite then the thrust of reading in vocational settings would be toward dealing with deficiencies. The strategies, in the latter situation, would be individualized and delivered on a case by case basis.

The previous two pieces of procedural information are fairly general; the third and fourth are specific. The third deals with how difficult literature in a specific occupational curriculum is to read. What is the readability level? The fourth deals with how able students are in terms of reading ability. Can students read literature necessary to succeed in a vocational program? We shall deal with these issues separately.

Readability Procedures

Readability procedures are devices to estimate the grade reading level (GRL) of selected pieces of literature. In other words, a readability analysis determines the approximate GRL a person must possess in order to read the literature analyzed. Note the underlining of estimate and approximate. It must be cautioned

that, although these procedures have been validated by extensive research, they are not the sole determinants of readability. Muncrief (1975) discussed a variety of other considerations that are involved in readability assessments. For our purposes of matching literature assessment to student ability an index of readability is a useful measure.

There is a second caution needed about readability procedures. Preliminary results of current research (Reference Note[2]) brings up serious questions about trying to find an average readability level of occupational literature. For example, what does it mean that the average (the word "mean" is normally substituted for the word "average") readability level of a textbook is ninth (9th) grade? Because the word average or mean is used, it can be assumed that some of the literature is higher than ninth and some of it lower. What the average does not tell us is the range of readability levels and the concentration (mode at any level) of readability level.

In order to make sense out of that argument, a little must be known of how readability assessments are done. When analyzing a textbook (or any other lengthy piece of literature) random samples are selected. These samples are analyzed and an average of all of their readability levels is calculated. That average is the mean readability level of the literature. We will get more explicit about how this is done in the next section.

To point out the problem with using the mean (average) some hypothetical samples have been graphed below. The graphs show the

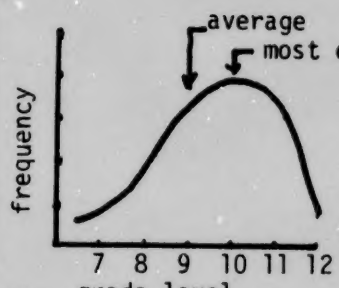
curve which would result if the frequencies of grade level of samples were plotted on the graph. The vertical axis of the graphs represents the frequency that samples were found to be at a particular grade level. The horizontal axis represents the specific grade levels. (See Figure 1)

All of the preceding graphs are of books at the ninth grade readability level. But they all differ in the concentration (mode) of levels. The point here is simply that the mean or average can be a deceptive statistic. The analysis can still be useful, providing the results include the range and distribution of readability scores sampled.

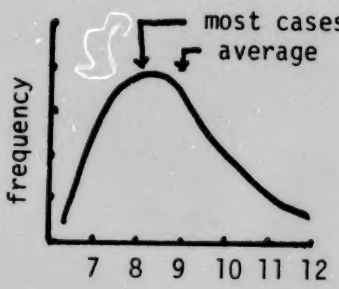
Two readability procedures will be discussed: (1) Fry procedure (See Figure 2); and (2) Flesh procedure (See Figure 3).

A form for calculating has been included to simplify the Flesh Formula calculations. (See Figure 4)

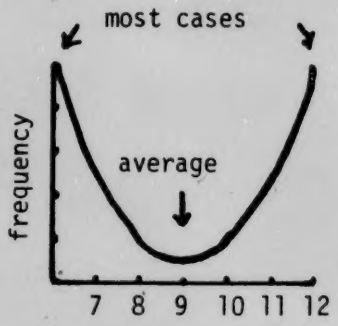
Figure 1: Sample Readability Graph



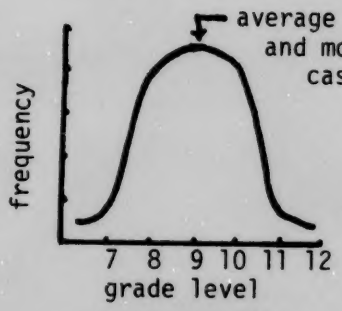
(most cases above 9th)



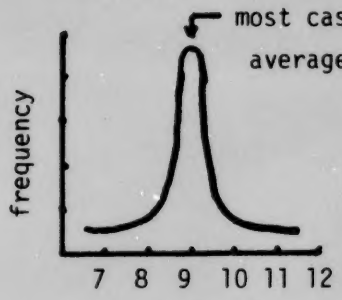
(most cases below 9th)



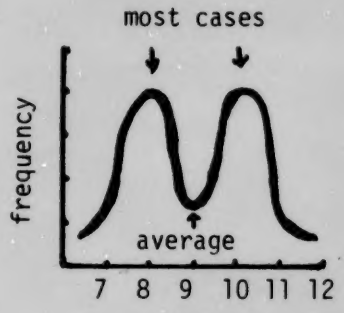
(most cases at highest and lowest levels)



(most cases at 9th substantial variability)



(most cases at 9th slight variability)



(most cases one grade higher and lower than average)

Figure 2: GRAPH FOR ES
by Edward Fry, Rutgers Universi
Average number of syll

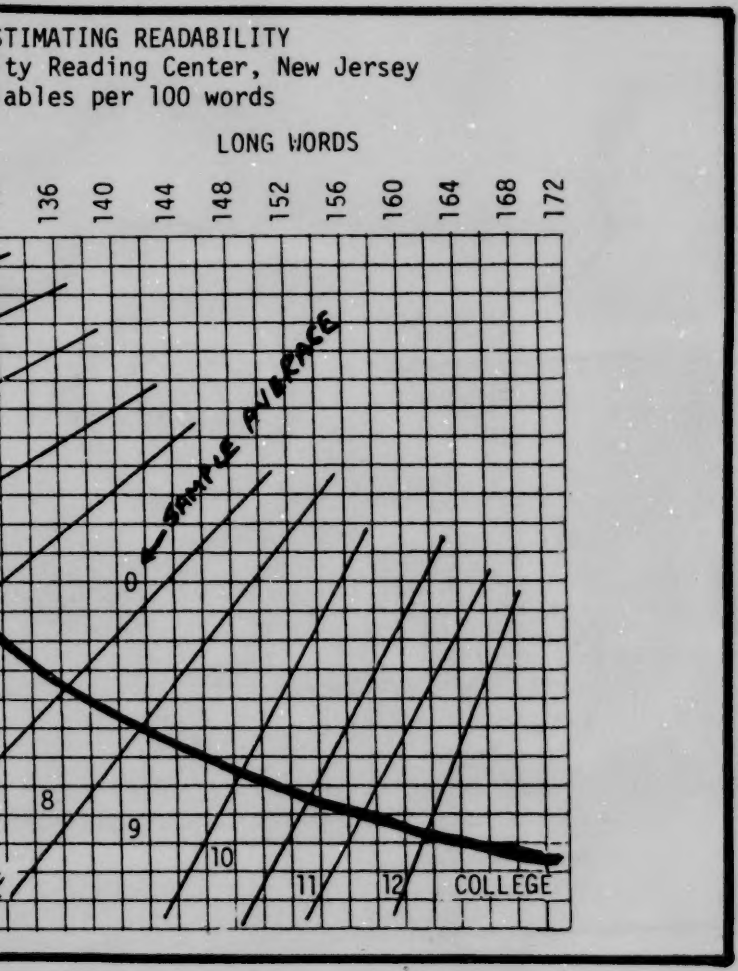

STIMATING READABILITY
ty Reading Center, New Jersey
ables per 100 words
LONG WORDS
136
140
144
148
152
156
160
164
168
172
SIMPLE AVERAGE
0
8
9
10
11
12
COLLEGE

Figure 2 (Continued)

rections: Use a stratified random procedure, at least five percent for books, more for shorter materials. For example: If a book is 350 pages long, five percent equals 17.5. 350 ÷ 17.5 equals 20. Select a starting number, for example: 6. The first sample page is 6; then 26; then 46; then 66; etc. If one of the pages has no text proceed one page at a time forward until a page is found from which a sample can be taken.

From each of these pages select 100 word passages (alternate positions on page from which taken. For example: beginning, middle, ending). Plot the average number of syllables and average number of sentences per 100 words on the above graph.

This will give you the average readability of the book.

Example:

	Syllables	Sentences
First 100 Words	124	6.6
Second 100 Words	141	5.5
Third 100 Words	158	6.3
Average	141	6.3

Then plot the syllables and sentences for each sample. This will illustrate the range of readability for the literature being analyzed.

(For further information and validity data, see April, 1968 Journal of Reading and March, 1969 Reading Teacher.)

Figure 3: FLESH READABILITY FORMULA PROCEDURE

There is one readability procedure that is easily used with the assistance of a simple calculator. The Rudolph Flesh (1949) Readability Formula involves a count of the syllables in the sample and words per sentence in conjunction with a mathematical formula. The result is a "Reading Ease Score" which translates into grade reading level.

I. 1. Count the words in the sample (100 words or more, if available).
   2. Count the number of sentences.
   3. Divide the total number of words by the total number of sentences.
   4. Multiply that total (average number of words in a sentence) by 1.015.

II. 1. Count the syllables in the sample.
   2. Multiply the number of syllables by 100.
   3. Divide that total by the number of words in the sample.
   4. Multiply that total by .846.

III. Add I and II.

IV. Subtract III from 206.835.
That is the reading ease score. It translates accordingly:

R.E.Score	Grade	R.E.Score	Grade
115-120	1	80- 89	6
110-114	2	70- 79	7
105-109	3	60- 69	8.5
100-104	4	50- 59	11
90- 99	5	30- 49	14.5
		0- 29	College Grad.

Flesh, Rudolph. The Art of Readable Writing. New York: Harper and Brothers, 1949.

Figure 4: Flesh Readability Procedure Form

Textbook_____ Publisher_____

Pg.#	#Wds. ÷ #Sent	X	x 1.015	#Syl x 100 ÷ #Wds.	x .846	Y

Figure 4 (Continued)

	Minus (x + y)	R.E. Score
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		
206.835		

R.E. Score	Grade
115-120	1
110-114	2
105-109	3
100-104	4
90-99	5
80-89	6
70-79	7
60-69	8.5
50-59	11
30-49	14.5
0-29	College Grad.

The textbook sample in Figure 5 demonstrates the rules.

Instructions for Calculations

WORD COUNT - Fry: Count all words up to 100 words (may end in partial sentence.) Flesh: Count all words up to approximately 100 (end on full sentence).

Numbers - such as 30, 1951, 27-A, L78G are each counted as one word.

Hyphenated words - one word.

Abbreviations - one word.

Acronyms - such as PVA, NSU, USA, AVA are each counted as one word.

SENTENCES - Fry: Count the sentences and determine the tenth of a sentence when ending in a partial sentence. Flesh: Count all sentences.

Parenthetical expression - (enclosed in brackets) is one sentence even if contained in another sentence.

Semi-colon or colon - If there is a semi-colon or colon in what we usually consider a sentence, that is considered to be another sentence. The easiest way to handle that is to count one sentence overall and add one sentence - count for each colon or semi-colon in the sentence.

RECORDING - Fry: Write down the number of sentences per 100 words. In the example the 100th word is "a." There are 5 full sentences, plus the partial sentence ending in "a." There are 9 words up to and including "a" and 16 words in the sentence. Divide 9 by 16 (9 ÷ 16). That result is approximately .56 and rounds to 0.6.

FIGURE 5: SAMPLE WITH WORD COUNT OVER WORDS

1 2 3 4 5 6 7 8
NOW A CHALLENGE COMES FROM THE WANKEL ROTARY

9 10 11 12 13 14 15 16 17 18
ENGINE. AS A DESIGN, THE WANKEL HAS BEEN AROUND FOR

19 20 21 22 23 24 25 26 27
OVER 30 YEARS. NAMED FOR ITS INVENTOR, DR. FELIX

28 29 30 31 32 33 34 35 36
HEINRICH WANKLE, IT WAS DEVELOPED OUT OF EFFORTS TO

37 38 39 40 41 42 43 44 45
CREATE A ROTARY TYPE VALVE FOR A MOTORCYCLE ENGINE.

46 47 48 49 50 51 52 53
WANKEL DID SUCCEED IN DESIGNING A ROTARY VALVE

54 55 56 57 58 59 60 61
WHICH WAS USED ON BOTH GERMAN MESSERSCHMIDT FIGHTERS

62 63 64 65 66 67 68 69 70
AND JUNKER BOMBERS DURING WORLD WAR II. AFTER THE

71 72 73 74 75 76 77 78 79
WAR, HE RESUMED RESEARCH ON THE ROTARY ENGINE AND,

80 81 82 83 84 85 86 87 88
IN 1951, OPENED HIS OWN LABORATORY WITH NSU, A

89 90 91
SMALL MOTORCYCLE MANUFACTURER.

92 93 94 95 96 97 98 99 100
WHILE WANKEL'S IDEA WAS TO BE USED AS A

101 102 103 104 105 106 107
SUPERCHARGER ON THE MOTORCYCLE, THAT SOON CHANGED.

BY 1954, NSU AND WANKEL DECIDED IT WAS POSSIBLE TO

BUILD A FOUR-STROKE CYCLE ROTARY AUTOMOTIVE ENGINE.

FIGURE 5 (CONTINUED)

BY 1957, THE FIRST WANKEL ENGINE WAS BEING TESTED.

IT WAS SMALL AND HAD A NUMBER OF IMPERFECTIONS.

(ROTH, A. C.; BAIRD, R. J. 1975, P. 207)

Therefore, for the Fry sentence count there are 5.6 sentences per 100 words. Flesh: Count to the end of the sentence in which the 100th word occurs. Therefore, there are 107 words and six sentences. Enter these figures on the form and complete the math involved.

SYLLABLES - Syllables are counted in the same way for each procedure. An easy way is to count only those syllables over 1 for each word. For example:

1 2 3 4 5
Now a chal/lenge comes from the Wen/kel ro/tar/y en/gine.

Complete the counting for the entire passage in the same manner. Your total then is added to the total number of words (100 for Fry; 107 for Flesh, in this example). That gives you the total syllable count.

RECORDING - Fry: Write down the total number of syllables. On the graph plot the total syllables (across) to the number of sentences per 100 words. That will give you the approximate readability level of that passage. Flesh: Write down the number of syllables in the space on the form and complete the mark as noted. Then add x and y and subtract that figure from 206.835. That is the Reading Ease score and translates to grade level on the chart.

The total sample syllable count and results for Flesh and Fry methods follow in Figure 6.

FIGURE 6: SAMPLE TEXT
WITH SYLLABLES MARKED

NOW A CHAL/LENGE COMES FROM THE WAN/KEL RO/TAR/Y EN/GINE. AS A DE/SIGN, THE WAN/KEL HAS BEEN A/ROUND FOR O/VER 3/0 YEARS. NAMED FOR ITS IN/VEN/TOR, DR. FE/LIX HEIN/RICH WAN/KEL, IT WAS DE/VEL/OPED OUT OF EF/FORTS TO CRE/ATE A RO/TAR/Y TYPE VALVE FOR A MO/TOR/CY/CLE EN/GINE.

WAN/KEL DID SUC/CEED IN DE/SIGN/ING A RO/TAR/Y VALVE WHICH WAS USED ON BOTH GER/MAN MES/SER/SCHMIDT FIGHT/ERS AND JUN/KER BOMB/ERS DUR/ING WORLD WAR II. AF/TER THE WAR, HE RE/SUMED RE/SEARCH ON THE RO/TAR/Y EN/GINE AND, IN 1/9/5/1, OPEN/ED HIS OWN LAB/OR/A/-TOR/Y WITH N/S/U, A SMALL MO/TOR/CY/CLE MAN/U/FACT/UR/ER.

WHILE WAN/KEL'S I/DE/A WAS TO BE USED AS A SU/PER/CHAR/GER ON THE MO/TOR/CY/CLE, THAT SOON CHANGED. BY 1954, NSU AND WANKEL DECIDED IT WAS POSSIBLE TO BUILD A FOURSTROKE CYCLE ROTARY AUTO-MOTIVE ENGINE. BY 1957, THE FIRST WANKEL ENGINE WAS BEING TESTED. IT WAS SMALL AND HAD A NUMBER OF IMPERFECTIONS. (ROTH, BAIRD; 1975, P. 207)

Note that for numbers and acronyms, each letter (number) counts as a syllable.

The following results were obtained from readability analyses of the preceding sample.

Fry:

100 words

5.6 sentences

163 syllables

11th grade

Flesh:

107 words

6 sentences

176 syllables

R.E. Score 49.58

11th grade, but at highest end.

Exercise 1

Following are three examples selected from other sections of the same textbook. Practice the procedure, marking syllables and sentence count directly on the samples.

Exercise 1 Sample 1

Piston Thrust Surfaces

During the compression stroke, the pressure of the confined airfuel mixture forces the piston toward one side of cylinder. See view A in Fig. 12-4. When the crankshaft throw passes TDC, burning and rapidly expanding gases push hard on the piston, forcing it against opposite side of cylinder. See B in Fig. 12-4.

In each instance, the sides of the piston forced against the cylinder wall are called thrust surfaces. These surfaces are at right angles (90 deg.) to the center line of the crankshaft and piston pin.

If the piston has too much clearance in the cylinder, side thrust during the compression and firing strokes will make it move, or "slap," from one side of the cylinder to the other. As it moves sideways, the piston will tend to tip or cock in the cylinder. This "loose

FIT" CAN BE VERY HARMFUL TO THE PISTON AND RINGS. THE PISTON MUST FIT THE CYLINDER PROPERLY TO AVOID SLAPPING. (ROTH, BAIRD; 1975, P. 173)

Exercise 1 Sample 2

Move positive lead to armature post of starter-generator. Leave negative lead grounded. Starter should operate and voltmeter should read about 11V. If engine does not start, and voltage is normal, starter is faulty. No start and little or no voltage indicates a loose or broken connection between starter switch and starter-generator connection. Clean, tighten and inspect or replace wiring. Recheck voltage.

COMMUTATORS AND BRUSHES

All DC starters and generators have commutators and brushes that occasionally need service. Start by cleaning the metal housing. Avoid getting cleaning solvent on insulated wiring.

Check for a worn bearing at either end of the armature shaft. (You can feel play with your hands and, usually, worn bearings are noisy when operating.)

IF THERE IS A COVER BAND, REMOVE IT. A RING OF SOLDER ALONG THE INSIDE OF THE BAND INDICATES THE UNIT HAS OVERHEATED. FURTHER REPAIR MUST BE DONE BY AN EXPERIENCED MECHANIC.

IF THE GENERATOR HAS NO COVER BAND, REMOVE THE LONG BOLTS RUNNING THROUGH THE HOUSING AND PULL OFF THE END PLATE NEAREST THE COMMUTATOR. (ROTH, BAIRD; 1975, P. 172)

Exercise 1 . Sample 3

If inspection and adjustment of the carburetor indicate need for repair, remove the carburetor from the engine. Wash the outside in a solvent. Disassemble and thoroughly wash each part. Lay the cleaned parts out on a clean white cloth so none become lost or damaged.

If the carburetor is very dirty, a commercial carburetor cleaner solution may be used. Be careful not to get any solution on hands or clothing. Wear safety classes. Put only the metallic carburetor parts in the solution and let them soak. Non-metallic parts can be damaged by harsh commercial cleaners.

After the parts have soaked for several hours, rinse them with a milder cleaning solvent and dry with compressed air. Do not dry the parts with a rag or paper towel. Lint will get into passages. Never clean holes or passages with wire or similar objects. These will

DISTORT THE OPENINGS AND MAY PREVENT THE ENGINE FROM RUNNING PROPERLY. (ROTH, BAIRD; 1975, P. 127)

SAMPLES: HOW SELECTED AND HOW MANY

It is important, if an accurate picture of the literature is to be obtained, that the samples to be analyzed be selected at random. Too many subjective errors would be introduced by merely paging through the book, picking what appears to be representative samples. The easiest way and one that is sufficiently random is entitled a stratified random sampling.

In order to achieve the stratified random sample, it must first be decided how many samples are to be drawn. A useful rule is to select samples from 5% of the pages in the book. Remember, however, that the more samples drawn, the more accurate will be the analysis. That point is demonstrated in the following analyses (See Figure 7) of the textbook under consideration in which 3, 6, 10, 15 were drawn. (Average was used in this case to distinguish between results of analyses in which increasing numbers of samples were drawn.)

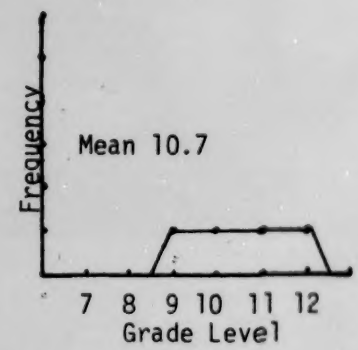
It is recommended that 5% sample or more be drawn for accuracy.

Procedure: Assume a book has 300 pages (not including glossary or index). A 5% sample requires (.05 x 300) 15 samples. To establish the starting page divide the total pages (300) by the total samples required (15). That result is 20. Randomly pick a number from 1-20. This can be done using numbers in a hat. That number is the starting page. Let's assume it is 6. The remainder of the pages are selected by adding 20 to 6, 20 to 26, 20 to 46, etc. until all the samples are drawn.

Figure 7: Sample Graphs of GRL Frequencies: 3, 6, 10, 15 Samples

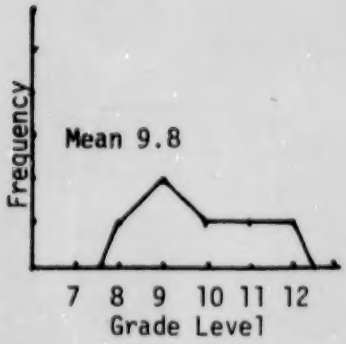
3 Samples

GRL	Freq.
9	1
11	1
12	1



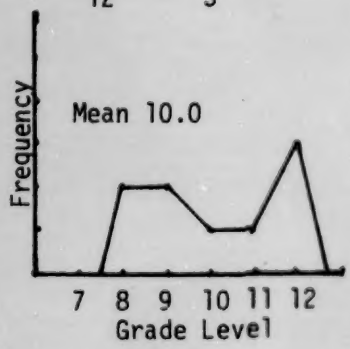
6 Samples

GRL	Freq.
8	1
9	2
10	1
11	1
12	1



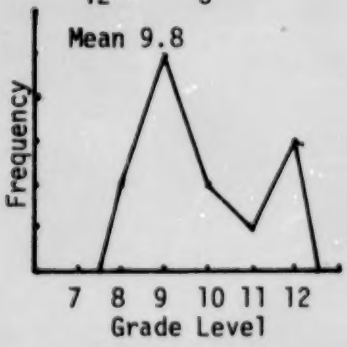
10 Samples

GRL	Freq.
8	2
9	2
10	1
11	1
12	3



15 Samples

GRL	Freq.
8	2
9	5
10	2
11	1
12	3



Now we know the pages of the book we will use in the analysis. If any of those pages contains no text (some may be pictures or diagrams) move one page at a time forward or backward until text is found. It is also recommended that the sample 100 words be selected alternatively from the beginning (B) and end (E) of the page. Therefore, page 6 would be 6-B (for beginning), page 26-E (for end), page 46-B, etc.

Exercise 2

Compute a stratified random sample schedule for the following:

1. Textbook with 350 pages.
2. Textbook with 1000 pages.
3. Textbook with 525 pages.

If the literature you plan to analyze contains less than 200 pages, but more than 25, select 10 samples. For literature of less than 25 pages, but more than 5, select every other page. For literature less than 5 pages, take a sample of every page.

On the following page (See Figure 8) is a form to assist you in recording your findings. It is always a good idea to keep a file of literature analyzed.

Figure 8: Readability Record

Author(s):

Title of Literature:

Publisher:

Publication Data:

Total Number of pages:

Percent of pages sampled:

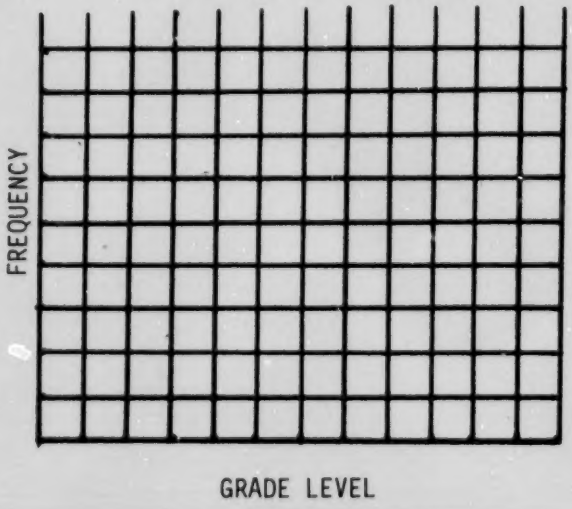
Procedure used:

Page numbers from which samples were taken:

Highest readability:

Lowest readability:

Graph for Plotting Results



SECTION 2
CLOZE PROCEDURE

STUDENT READING ABILITY

Diagnostic reading test scores are often available for students in vocational programs. These scores, normally on file at the home school (in the counselors office at the comprehensive high school), are useful indicators of a student's general reading ability. How well they relate to vocational reading requirements is subject to conjecture. There simply has not been a concerted effort to separate vocational reading skill from general literacy skill. Because of these unknowns it is strongly recommended that you not accept a GRL score as final. Standardized reading test scores are useful indicators, but they should be supplemented with teacher made vocational reading tests.

A useful and highly adaptable reading test is the cloze procedure

> The cloze procedure is an objective measure of language correspondence between reader and writer. It consists of a cloze (word) unit, a single occurrence of a successful attempt to reproduce accurately a part deleted from a message, by deciding from the context that remains what the missing part should be (Taylor, 1953).
>
> The cloze procedure differs from vocabulary contextual tests. Rather than choosing omitted words because of definition and purpose, the cloze units are chosen mechanically; every fifth word, for example, occurring at any point in a continuous passage is omitted. The cloze design incorporates control against misrepresenting strength/weakness in content vocabulary as an indication of the test subject's ability/inability to read (Thornton, 1979).

Any piece of literature can be clozed. That includes textbooks, occupational literature, safety messages, codes, medical contraindications, literally anything. The procedure is described below:

1. Select a piece of literature.
2. Leave the first sentence intact.
3. Delete every fifth word.
4. Leave the last sentence intact.
5. Instruct the student to read the entire passage first, then begin filling in the blanks.
6. Instruct the student to be aware when guessing is the rationale for word selection, but to guess when other rationale fails.

Scoring the test is accomplished as follows:

0-39.9% Frustrational level (Student will not be able to read the literature)

40.0-69.9% Instructional level (Student will require intervention to be able to read the literature)

70.2-100.0% Independent level (Student is able to read the literature without intervention)

On the following pages five different cloze tests have been prepared using on-the-job literature (Reference note 3). The correct words which have been deleted are listed following each example.

FIGURE 9: GRAPHICS CLOZE TEST

INSTRUCTIONS FOR USING MULTILITH CLEANER SHEET*

THE MULTILITH CLEANER SHEET PROVIDES AN EFFICIENT, TIME-SAVING METHOD OF CLEANING INK ROLLERS ON MULTILITH OFFSET DUPLICATORS. THE CLEANER _____ ABSORBS ALL INK LOOSENED _____ THE INK ROLLERS BY _____BLANKROLA SOLVENT.

TO OBTAIN _____ RESULTS WHEN USING THE _____ CLEANER SHEET, FOLLOW THESE _____:

BE SURE THE MASTER _____ BEEN REMOVED FROM MASTER _____ AND ALL OPERATING CONTROLS _____ THE DUPLICATOR ARE IN "_____" POSITION.

ON DUPLICATORS EQUIPPED _____ SIMFLO UNIT, REMOVE BOTTLE _____ SIMFLO SOLUTION. LEAVE SIMFLO _____ SCREWS IN NORMAL OPERATING _____. USING MULTILITH PADS, SOAK _____ ALL SIMFLO FOUNTAIN SOLUTION _____ IN FOUNTAIN.

FIGURE 9 (CONTINUED)

1. ATTACH _____ SHEET TO MASTER CYLINDER _____ THE SAME MANNER AS _____ WOULD ATTACH A MASTER. _____ THE LEAD AND TRAILING _____ OF THE CLEANER SHEET (_____ FIRMLY WITH YOUR FINGERS) _____ THE LEAD AND TRAILING _____ OF MASTER CYLINDER SO _____ CLEANER SHEET CONTACTS CYLINDER _____ AT ALL POINTS.

NOTE: _____ DUPLICATORS USING REPELEX UNIT, _____ REPELEX FORM ROLLER HAS _____ RECENTLY RE-COVERED, REMOVE ROLLER _____ DUPLICATOR TO AVOID CONTACT _____ CLEANER SHEET. AFTER MOLLETON _____ HAS BEEN COMPRESSED BY _____, IT WILL NOT BE _____ TO REMOVE REPELEX FORM _____.

2. REMOVE EXCESS INK FROM _____ ROLLERS BY INSERTING ONE _____ TWO SHEETS OF PAPER _____ INK ROLLERS WHILE SLOWLY _____

FIGURE 9 (CONTINUED)

HANDWHEEL OF DUPLICATOR. THEN _____ SHEETS OF PAPER BY _____ ROTATION OF HANDWHEEL.

3. _____ THE DUPLICATOR (FOUNTAIN ROLLER _____) AND APPLY MULTILITH BLANKROLA _____ EVENLY ACROSS ROLLERS, USING _____ SMALL OIL CAN AS _____ DISPENSER. (ON DUPLICATORS EQUIPPED _____ A SIMFLO UNIT, APPLY MULTILITH BLANKROLA SOLVENT TO DUCTOR ROLLER WITH ROLLER LATCHED IN "OFF" POSITION. ON DUPLICATORS EQUIPPED WITH A MOLLETON MOISTURE UNIT, APPLY MULTILITH BLANKROLA SOLVENT TO AUXILIARY OSCILLATOR OR TOP DISTRIBUTION ROLLER.)

(SEE WORDS LIST, FOLLOWING PAGE)

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*"INSTRUCTIONS FOR USING MULTILITH CLEANER SHEET." WILLOW STREET AV.T.S., WILLOW STREET, PENNSYLVANIA.

FIGURE 9 (CONTINUED)

SHEET	REMAINING	WITH
FROM	CLEANER	COVER
MULTILITH	IN	USE
BEST	YOU	NECESSARY
MULTILITH	FORM	ROLLER
INSTRUCTIONS	ENDS	INK
HAS	PRESSING	OR
CYLINDER	TO	INTO
OF	ENDS	TURNING
OFF	THE	WITHDRAW
WITH	SNUGLY	REVERSING
CONTAINING	ON	START
ADJUSTING	WHERE	STATIONARY
POSITION	BEEN	SOLVENT
UP	FROM	A
		A
		WITH

"INSTRUCTIONS FOR USING MULTILITH CLEANER SHEET."
WILLOW STREET A.V.T.S., WILLOW STREET, PENNSYLVANIA.

FIGURE 10: PHOTOGRAPHIC CLOZE TEST

THE NATURE OF THE WORK*

PICTURES ARE USED FOR A VARIETY OF REASONS. SOME-
TIMES _____ ARE TO ADD INTEREST _____
ATMOSPHERE, BUT GENERALLY THEY _____
SUPPLEMENT TEXT MATTER. THEY _____ EXPAND
THE INTEREST OF _____ MESSAGE. THEY MAY BE
_____ RENDITIONS OF DETAIL AND _____
RELATED TO PRODUCTS OR _____ ELEMENTS RE-
FERRED TO IN _____ MATTER. WHETHER THEY ARE
_____ TO BE GENERALLY PLEASING _____
SPECIFICALLY REPRESENTATIVE, PAPER PLAYS _____
IMPORTANT ROLE.

FOR LETTERPRESS _____, THE LEVELNESS AND
REFINEMENT _____ A PRINTING SURFACE ARE
_____ RELATED TO THE UNIFORMITY _____
ACCURACY WITH WHICH INK _____ BE TRANSFERRED
FROM A _____ PLATE TO THE PAPER'S _____.
THE UNIFORMITY, AMOUNT, AND _____ PLACEMENT
OF INK ON _____ DETERMINES THE QUALITY OF
_____ PRINT.

FIGURE 10 (CONTINUED)

SINCE MOST PICTORIAL _____ WILL BE COMPOSED OF _____ DOTS, THE GREATER THE _____ OF DOTS (FINER THE _____ SCREEN), THE SMOOTHER AND _____ REFINED THE PAPER SURFACE _____ BE IN ORDER FOR _____ DOT TO PRINT ACCURATELY. _____ ARE 14,400 DOTS IN _____ SQUARE INCH OF A _____ HALFTONE. THERE ARE 22,500 _____ A SQUARE INCH OF _____ 150-LINE HALFTONE. AN 8 1/2 _____ 11 INCH FOUR-COLOR HALFTONE _____ 8,415,000 DOTS, AND EACH _____ DO ITS JOB WELL!

_____ ADDITION TO TRANSFERRING INK _____, THE PAPER SURFACE HAS _____ DIRECT BEARING ON HOW _____ A PRINT CAN BE _____, HOW STRONG OR ACCURATE _____ APPEARS, AND HOW BRILLIANT _____ PRINT APPEARS TO BE. _____ FACT APPLIES TO OFFSET _____ - WHERE THE LEVELNESS OF _____ IS NOT SO VITAL _____ GOOD INK TRANSFER - AS _____ AS TO LETTERPRESS.

FIGURE 10 (CONTINUED)

SMOOTH, REFINED SURFACES ALSO PERMIT CLOSER, MORE UNIFORM, AND EASIER CONTROL OF THE APPEARANCE INK WILL HAVE - GLOSSY, DULL OR IN BETWEEN.

(SEE WORDS LIST, FOLLOWING PAGE)

---

*PRINTING PAPERS AND THEIR USES. S. D. WARREN COMPANY, BOSTON, MASSACHUSETTS.

FIGURE 10 (CONTINUED)

THEY	WILL	IN
AND	PRINTING	A
DIRECTLY	SURFACE	X
MAY	PRECISE	CONTAINS
A	PAPER	MUST
PRECISE	THE	IN
COLOR	MATTER	PROPERLY
OTHER	HALFTONE	A
TEXT	NUMBER	CLEARLY
INTENDED	HALFTONE	SEEN
OR	MORE	COLOR
AN	MUST	A
PRINTING	EACH	THIS
OF	THERE	LITHOGRAPHY
DIRECTLY	A	SURFACE
AND	120-LINE	TO
		WELL

PRINTING PAPERS AND THEIR USES. S. D. WARREN COMPANY, BOSTON, MASSACHUSETTS.

50

Figure 11: Welding Cloze Test

The oxyfuel processes involve the application of a flame for welding, brazing, cutting, and heating. This flame is produced _____ burning fuel with commercially _____ oxygen. The two gases _____ combined in a torch _____, when burned at the _____ of the torch, produce _____ gas flame of intense _____. The temperature of this _____ - 5000 to 6000 degrees _____ depending on fuel used - _____ high enough to melt _____ metals, making the welding _____ these metals possible. In _____, a jet of oxygen _____ supplied in addition to _____ flame.

The fuels used _____ acetylene, and in the _____ outfit, Mapp gas or _____. When burning, the flame _____ the oxygen in the _____ that could oxidize the _____ metal. These fuels, therefore _____ a cleaner weld with _____ metal bright, free of _____,

FIGURE 11 (CONTINUED)

AND READY-FLOWING. ANY _____ OXYFUEL WOULD MELT, OXIDIZE _____ BURN STEEL BUT WOULD _____ FUSE METAL TOGETHER. THE _____ OR MAPP GAS FLAME, _____ ITS HIGH-HEAT-TRANSFER INNER CONES, _____ ITS HEAT BETTER THAN _____ OF OTHER FUELS.

1.2 OXYGEN

_____ COMPRISES APPROXIMATELY A FIFTH _____ THE ATMOSPHERE. IT IS _____ BY COMMERCIAL PROCESSES AND _____ COMPRESSED INTO CYLINDERS FOR _____ WITH AIRCO EQUIPMENT. AIRCO _____ IS 99.5% OR GREATER, _____ PURITY.

1.3 ACETYLENE AND MAPP GAS

ACETYLENE AND MAPP _____ FLAMMABLE, EASILY-IGNITED GASES THAT _____ WITH GREAT HEAT.

ACETYLENE _____ GENERATED BY THE ACTION _____ WATER ON CALCIUM CARBIDE _____

FIGURE 11 (CONTINUED)

COMPRESSED INTO CYLINDERS CONTAINING _____ POROUS FILLER AND AN _____ FLUID (ACETONE).

MAPP IS _____ LIQUIFIED ACETYLENE COMPOUND, WITH _____ CHEMICAL NAME - STABLIZED METHYLACETYLENE _____. IT PERFORMS ALMOST LIKE _____ EXCEPT FOR WELDING OF _____ PLATE OVER 5/16 INCH THICK. _____ MAPP IS EASIER, CHEAPER AND SAFER TO USE.

1.4 COMPRESSED GAS CYLINDERS

OXYGEN, ACETYLENE, AND MAPP GAS ARE GENERALLY SUPPLIED UNDER PRESSURE IN STEEL CYLINDERS.

(SEE WORDS LIST, FOLLOWING PAGE)

OXYFUEL: WELDING AND CUTTING. AIRCO WELDING PRODUCTS, 1970.

FIGURE 11 (CONTINUED)

BY	ACETYLENE	IS
PURE	ABSORBS	USE
ARE	AIR	OXYGEN
AND	WELD	IN
TIP	PRODUCE	ARE
A	MOLTEN	BURN
HEAT	CONTAMINATION	IS
FLAME	OTHER	OF
F	AND	AND
IS	NOT	A
MOST	ACETYLENE	ABSORBING
OF	WITH	A
CUTTING	CONCENTRATES	THE
IS	THAT	PROPADIENE
THE	OXYGEN	ACETYLENE
ARE	OF	STEEL
HANDICRAFTER	EXTRACTED	BUT

OXYFUEL: WELDING AND CUTTING. AIRCO WELDING PRODUCTS, 1970.

FIGURE 12: TEXTILE CLOZE TEST

SEWING KNITS AND STRETCH FABRICS*

DOUBLE AND SINGLE KNITS ARE MANUFACTURED IN MANY DIFFERENT FIBRES AND QUALITIES, SUCH AS COTTON, WOOL, SILK, AND SYNTHETICS.

_____ TO ALL OF THEM _____ THAT THEY STRETCH AND _____ REQUIRE ELASTIC SEAMS.

STRETCH _____ ARE WOVEN FABRICS WHICH, _____ VARIOUS PROCESSES, HAVE BEEN _____ ELASTIC. THEY MAY STRETCH _____ OR WIDTHWISE OR BOTH. _____ PRINCIPLE THEY CAN BE _____ IN THE SAME WAY _____ KNIT FABRICS.

USE A _____ THREAD AND FINE SEWING _____ NEEDLE, NO. 70-80. IT _____ HAVE A GENTLY ROUNDED _____ - VIKING'S STANDARD NEEDLE FULFILS _____ REQUIREMENT - AND OF COURSE _____ MUST BE UNDAMAGED. ADJUST _____ STITCH LENGTH TO SUIT _____ MATERIAL. THE UPPER THREAD _____ MAY BE LOOSENED SOMEWHAT _____ MATERIALS HAVING GREAT ELASTICITY.

FIGURE 12 (CONTINUED)

_____ IS EASIEST TO SEW _____ AND OVER-CAST IN ONE _____ - THE SEAM ALLOWANCES ARE _____ OVERCAST TOGETHER. OVERLOOK STITCH _____ SUITABLE FOR MOST KNITS _____ STRETCH FABRICS. OVERCAST STITCH _____ BE PREFERABLE FOR THIN _____ WHEREAS DOUBLE OVERLOCK STITCHING _____ OFTEN BEST FOR LOOSE, _____ MATERIAL. IT IS EASY _____ SEE WHICH SEAM IS _____ BY TESTING THEM ON _____ PIECE OF THE MATERIAL _____ BE STITCHED.

IF YOU _____ THE SEAMS TO BE _____ APART, USE ELASTIC STRAIGHT _____. OVER-CASTING CAN BE DONE _____ THREE-STEP ZIG-ZAG, OVERLOCK STITCH, _____ STITCH OR DOUBLE OVERLOCK _____. HOWEVER, NOT ALL KNIT _____ NEED TO BE OVERCAST. _____ PULLING THE EDGE OF _____ SCRAP OF THE FABRIC _____ SEE IF IT FRAYS _____ STARTS A RUN.

FIGURE 12 (CONTINUED)

FOR _____ SEAMS IN CHILDREN'S CLOTHES, _____ EXAMPLE, DOUBLE-ACTION STITCHING IS _____ MOST SUITABLE. ALL TOP _____ SHOULD BE DONE USING _____ STRAIGHT STITCH OR RIC RAC AS THESE STITCHES ARE STRETCHABLE. SET A SLIGHTLY LOOSER TENSION IN THE UPPER THREAD.

(SEE WORDS LIST, FOLLOWING PAGE)

---

*"SEWING KNITS AND STRETCH FABRICS." VIKING SEWING MANUAL, 1975.

FIGURE 12 (CONTINUED)

COMMON	THE	PREFER
IS	TENSION	PRESSED
THEREFORE	FOR	STITCHING
FABRICS	IT	WITH
BY	TOGETHER	OVERCAST
MADE	OPERATION	STITCH
LENGTHWISE	THEN	FABRICS
IN	IS	TRY
SEWN	AND	A
AS	MIGHT	AND
FINE	FABRICS	OR
MACHINE	IS	OVERLAP
SHOULD	LOOPED	FOR
POINT	TO	THE
THIS	BEST	STITCHING
IT	A	ELASTIC
THE	TO	

"SEWING KNITS AND STRETCH FABRICS." VIKING SEWING MANUAL, 1975.

Figure 13: Medical Assisting

Giving injections is a serious and important part of medical treatment. In a very real _____ the same kind of _____ and caution employed in _____ operating procedure must be _____ in giving injections. Two _____ objects are being introduced _____ the body, a hypodermic _____ and the medication, and _____ should be done with _____ much precision as a _____ employs when using a _____. The accuracy of the _____ of injection sit and _____ excellence of the technique _____ injection help control the _____ of the medication. A _____ injection or improper technique _____ administering the injection may _____ medication from acting most _____ or, more important, may _____ irreparable damage. A physician _____ an injection for a _____ only when it is _____ necessary or the manner _____ treatment most suited to

FIGURE 13 (CONTINUED)

_____ EXISTING CIRCUMSTANCES. SOME OF _____ REASONS AND ADVANTAGES FOR _____ INJECTIONS OF MEDICATION (ALSO _____ TO AS PARENTERAL THERAPY) _____:

1. TO ADMINISTER MEDICATION _____ THE MENTAL OR PHYSICAL _____ OF THE PATIENT MAY _____ ANY OTHER ROUTE DIFFICULT _____ IMPOSSIBLE.
2. TO ACHIEVE _____ QUICK RESPONSE TO THE _____.
3. TO GUARANTEE THE _____ OF THE AMOUNT OF _____ RECEIVED.
4. TO OBTAIN _____ SURE RESPONSE FROM THE _____.
5. TO PREVENT IRRITATION _____ THE DIGESTIVE SYSTEM, LOSS _____ MEDICATION THROUGH INVOLUNTARY EJECTION _____ DESTRUCTION BY DIGESTIVE ACIDS.
6. TO ANESTHETIZE A SPECIFIC _____ OF THE BODY.

FIGURE 13 (CONTINUED)

7. _____ CONCENTRATE MEDICATION AT A _____ LOCATION IN THE _____.

INTRAMUSCULAR INJECTIONS _____ GIVEN WHEN A QUICK _____ PROLONGED ACTION IS PREFERRED _____ AN IMMEDIATE EFFECT OF SHORT DURATION. BY INJECTING MEDICATION INTO THE MUSCLE A DEPOSIT OF MEDICINE IS FORMED WHICH IS GRADUALLY ABSORBED INTO THE BLOOD STREAM. WHEN GIVEN PROPERLY, THE INTRAMUSCULAR INJECTION IS PROBABLY THE EASIEST, SAFEST, AND BEST TOLERATED OF THE SEVERAL TYPES OF INJECTIONS.

(SEE WORDS LIST, FOLLOWING PAGE)

INTRAMUSCULAR INJECTIONS, WYETH LABORATORIES, PHILADELPHIA, PA. 19101, MAY 1969.

FIGURE 13 (CONTINUED)

SENSE	IN	OR
PREPARATION	PREVENT	A
AN	EFFICIENTLY	MEDICATION
EXERCISED	CAUSE	ACCURACY
FOREIGN	ORDERS	MEDICATION
INTO	PATIENT	A
NEEDLE	ABSOLUTELY	PATIENT
THIS	OF	OF
AS	THE	OF
SURGEON	THE	OR
SCALPEL	GIVING	AREA
CHOICE	REFERRED	TO
THE	ARE	SPECIFIC
OF	WHEN	BODY
EFFECTIVENESS	STATE	ARE
MISDIRECTED	MAKE	BUT
		TO

INTRAMUSCULAR INJECTIONS, WYETH LABORATORIES, PHILADELPHIA, PA. 19101, MAY 1969.

Exercise 3

Cloze the following passage and write out the instruction to the students regarding how they should proceed.

Like pistons and piston rings, connecting rods, bearings and valves are used in areas of the engine which demand close "fits." Yet some extra clearance must be allowed for expansion of parts due to high temperatures. While there are differences between makes of engines, maintenance is much the same for all.

Special attention must be given to the four cycle engines because there are more parts involved that require service. Rod and bearing service is the same for both two cycle and four cycle types. The valve system of two cycle engines (major area of difference) will be treated alone near the end of the chapter.

CONNECTING RODS AND BEARINGS

The connection rod attaches the piston to the crankshaft, Fig. 13-1. The upper end has a hole through which the piston pin is passed. The lower end has a large bearing which fits around the crankshaft journal, Fig. 13-1.

The lower end of the connecting rod usually is split when friction type bearings are used. The place at which the halves separate is called the parting line. When needle or roller bearings are used, the rod end can be split or solid. See Figure 13-2.

A variety of connection rods, both split and solid, are pictured in Figure 13-3. Roller bearings, needle bearings and precision inserts are also shown. (Roth, Baird; 1975, p. 185)

Exercise 3: Answer Sheet

Instructions:

Words List:

The cloze procedure can also be used as a teaching technique. A variety of cloze modifications are useful for vocational teachers.

The changes in the procedure reflect the purpose of the exercise. If, for example, an occupational instructor wishes to highlight safe practices in a shop and be certain that the student reading safety literature understands what is being read, the passage can be "clozed," deleting those words which are critical to the safe practices comprehension. The following spray painting passage with "instructional modification" words (to be deleted) underlined illustrates the technique:

SAMPLE: INSTRUCTIONAL MODIFICATION CLOZE

> Electrostatic spraying with a hand-held gun requires extra care. The gun, the piece to be sprayed, and all conductive equipment must be grounded to prevent sparking. While you are spraying, the gun must be held twice the sparking distance or at least 12 inches from the work and other conductive surfaces.
>
> All electrical equipment must be in another room or well away from the spraying area (at least 20 feet) or it must be of the type approved for hazardous locations and explosive areas. (HEW Publication, NIOSH 76-178, p. 8)

Another modified cloze teaching technique is the "lexical cloze." Lexical is defined as relating to words of a language. The lexical cloze involved deletion of words according to the kinds of words they are, such as nouns, verbs, adjectives, etc. A later segment of this article develops case grammar modifications utilizing the lexical cloze, establishing applicability for

occupational education reading intervention. The example which follows illustrates use of verb deletions in a cosmetology application. The words to be deleted have been underlined:

> After hair has been lightened evenly and sufficiently with Wellite Cream Bleach, shampoo lightly and towel-dry thoroughly - or dry under a cool dryer if an excessive amount of yellow or gold has to be overtoned.
>
> 1. Part the hair into four sections from forehead to neck and from ear to ear. Outline each section with Color Charm Toner mixture as you start applying to that section.
>
> 2. Starting at the crown with one of the back sections, apply Color Charm Toner mixture to root area first. Make ¼ or ½ inch partings. Proceed to root area of other back section and then root areas in front.
>
> 3. Immediately after the root areas are completed, apply Color Charm Toner mixture to the entire length of hair, combining through for even distribution. Leave hair loose--do not pack down. If the ends are over-porous or badly damaged, comb mixture through to ends only during the last 5 to 10 minutes of developing time.
>
> 4. Total developing time is usually 20 to 25 minutes. Use strand test to check color development.
>
> 5. When desired color has been reached, rinse thoroughly and give a light shampoo using a non-stripping shampoo, such as Wella Color Care Shampoo. (Product Information Insert, Wella Corp., 1975).

Note that only the verb's involving an action on the part of the student have been marked for deletion. It is the activity that is emphasized in this reading intervention exercise.

When used as a teaching technique, the cloze procedure is easily adapted to provide for increasing degree of difficulty.

Often vocational students have experienced a history of failures in reading. The pattern is conducive to diminished motivation in an attempt to read. In order to break the pattern and increase the likelihood of a motivated reader, a pattern of reading successes is useful. Literature of any level of readability can be clozed. Thus, vocational literature at a low readability level can be used for those students who need a success stimulus. In addition, for teaching purposes, synonymous or words close to the correct word can be accepted. The number of clozed words can be decreased, instead of following a schedule. The next example illustrates this point:

MINIMUM STANDARDS: MULTI-USE UTENSILS

All multi-use eating and drinking utensils shall be subjected to one of the following approved processes after each usage:

Manual Washing, with Hot Water Sanitizing.

A three-compartment sink, equipped with a heating device which will maintain the temperatures specified below, is required for this method:

Step 1. Scrape and rinse soiled dishes, glassware or utensils.

Step 2. Wash in hot water with an effective detergent in the first compartment of the sink.

Step 3. Rinse in clean hot water in the second compartment.

Step 4. Immerse in clean hot water at 170° F. for ½ minute or more in the third compartment.

(Pennsylvania Department of Health, 1975).

For the word "soiled," the student would be correct inserting "dirty," for example. Note that only three deletions have been made and all are heavily clued. (Reference Note

CASE GRAMMAR AND THE CLOZE PROCEDURE

Gibson and Levin (1979) describe Fillmore's theory of case gammar. ". . . which imaginatively combines syntactic and semantic features." The study of meanings (semantics) and the orderly system of words (snytax) combine in Fillmore's Case Concepts (Brown, 1973). The theory of case grammar is easily adapted to teaching techniques using the cloze procedure. The following illustrations demonstrate the usage:

Agentive (A) - "The typically animate, perceived instigator of action."

James Watt, in his work with early steam engines, wanted some simple way to measure their power output (Roth, Baird; 1975, p. 113).

Instrumental (I) - "The inanimate force or object casually involved in the state or action named by the verb."

Preignition creates a pinging sound, resulting from severe internal slack (p. 181).

Dative (D) - "The animate being affected by the state or action named by the verb."

The engine technician is constantly in danger of injury from caustic materials utilized in her work.

Factive (F) - "The object or being resulting from the state or action named by the verb."

Compression release is one of many advances in small engines that eases the chore of engine start up (Roth, Baird; 1975, p. 203).

Locative (L) - "The location or spatial orientation of the state or action named by the verb."

The flyweights remain in this position until the engine is stopped (Roth, Baird; 1975, p. 203).

Objective (O) - "The semantically most neutral case: anything representable by a noun whose role in the state or action named by the verb depends on the meaning of the verb itself."

The snap rings in each boss prevent the pin from rubbing on the cylinder surface.

Benefactive (B) - "A noun deriving benefit of the action of the verb."

The coil power test determines the coil's ability to provide an adequate spark (Roth, Baird; 1975, p. 151).

Comitative (C) - In accompaniment.

Coils that are permanently grounded to the coil laminations must show a full deflection of the meter needle to the right of the scale (Roth, Baird; 1975, p. 151).

Temporal (T) - When the verb is accomplished or occurs.

At starting speeds, this change is just great enough to turn-on the silican controlled rectified... (Roth, Baird; 1975, p. 88).

Modified cloze techniques can be used as introductory exercises, included in self-instruction packets, adapted for games, or structured for remedial work. They provide an excellent method of coordinating in-class vocational work and English or remedial reading treatment. (Reference Note 4)

Exercise 4

Underline each word in the following passage which could be clozed by Fillmore rules, entering above the word the letter which indicates the rule used.

PRACTICAL EFFICIENCY

In theory, each gallon of gasoline contains enough energy to do a certain amount of work. This may be thought of as potential energy. Unfortunately, engines are not efficient enough to use all the potential energy in the fuel. Practical efficiency takes into consideration power losses caused by friction, incomplete burning of the air-fuel mixture, heat loss, etc. Practical efficiency is simply an overall measurement of how efficiently an engine uses the fuel supply.

MECHANICAL EFFICIENCY

Mechanical efficiency is the percentage of power developed in the cylinder (indicated horsepower) compared with that which is actually delivered at the crankshaft (brake horsepower). Brake horsepower is always less than indicated horsepower. The difference is due to friction losses within the engine. Mechanical efficiency runs about 90 percent, indicating an internal friction loss of about 10 percent.

THERMAL EFFICIENCY

Thermal efficiency (heat efficiency) indicates how much of the power produced by the burning air-fuel mixture is actually used to drive the piston downward. (Roth, Baird; 1975, p. 121)

SECTIONS 3 - 7

READING VOCATIONAL TEXTS

READING VOCATIONAL TEXTS

The following five sections each present a set of important content reading skills. Only those skills particularly relevant to vocational texts have been included. Moreover, each skill has been broken down into segments requiring no more than 5-10 minutes of class time every other day. All homework utilizes the text assignments you would normally require at that point in your course. Because students must pay careful attention to their text in order to complete the reading skill assignment, they should more thoroughly understand the content material than they ordinarily would.

Each section presents the given skill using a variety of vocational examples. Opportunities are then provided for you to apply the skills so that you can be assured of mastering each one.

Following the individual skill discussions is a section called "Textbook Application." It is here that you apply each skill to your own course textbook. This second application accomplishes three purposes: 1) It allows you to locate examples and sample exercises that you can use in your classroom, thereby greatly reducing extra preparation time reading instruction might entail; 2) It enables you to tailor the skills to your text; and 3) It gives you an additional practice opportunity, this time using the same materials your students will use.

At the end of each section are additional suggestions for teaching the new skills.

SECTION 3-7 TIME FRAME

SECTION		TIMING
3	Basic Vocabulary Skills	Weeks 1 and 2
	Formal definitions	
	Synonyms	
	Illustrations	
	Glossaries	
	Textbook application	
	Teaching students basic vocabulary skills	
4	Vocabulary II: Advanced Context Clues	Week 3
	Explanations	
	Examples	
	Textbook application	
	Teaching students to use advanced context clues	
5	Paragraph Comprehension	Weeks 4, 5 and 6
	Paragraph subject	
	Paragraph main idea	
	Textbook application	
	Teaching students paragraph comprehension	
6	SQ4R	Weeks 7 and 8
	The SQ4R method of study	
	Textbook application	
	Teaching SQ4R	

SECTION		TIMING
7	Recognizing and Recording Complex Information	Weeks 9, 10 and 11
	Classification	
	Comparison	
	Cause and effect	
	Textbook application	
	Teaching students to recognize and record complex information	

SECTION 3
BASIC VOCABULARY SKILLS

Section 3: Vocabulary I - Basic Vocabulary Skills

Central to each vocational field is its specialized technical vocabulary. Complete and rapid comprehension of this vocabulary is imperative for the student. Because it is essential for students to understand the technical terms in their field, most textbook authors have taken care to provide definitions and other comprehension aids. The simplist of these is the use of italics or boldfaced type to highlight important terms. Four other aids are discussed below: formal definitions, synonyms, illustrations, and glossaries.

Formal Definitions

Often, an author will define an important technical term in the sentence that introduces it.

> Compressive strength is the ability of a material to resist being crushed. (Giachino and Weeks; 1976, 26)

term	definition
compressive strength	the ability of a material to resist being crushed

Clue words warn the reader that a definition is included in the sentence. These include "is," "means," "is referred to," "is called," and "is defined as." Locate the technical term and its definition in the following examples (remember that a technical term may include one word or several).

Exercise 5

A bill of materials is a table of information that tells the requirements for a given project (Feirer & Hutchings, 1976, 58).

term _____ definition _____

Indexing can be defined as the act of matching the circumference of a workpiece into any desired number of divisions (Nelson, Porter, 1973, 299).

term _____ definition _____

Positive charge carriers are called "holes" (Zbar, 1967, 2).

term _____ definition _____

Synonyms

As an alternative to a formal definition, a text may clarify a technical term by the use of a synonym. The synonym may be enclosed in commas or parentheses directly following the term. It might also be set off by dashes (--) or the word "or." Locate the technical term and its synonym in the following examples.

Exercise 6

The pressure (pounds per square inch) is referred to and abbreviated as psi (Barkerhouse, 1975, 4).

term _____ synonym _____

One must understand the system to accurately diagnose (identify) mechanical difficulties (Althouse, Turnquist, Bracciano, 1975, 99).

term	synonym
_____	_____

Manufacturers have adopted a standard EIA (Electronic Industries Association) color-coding system for determining resistance or ohmic values of low-powered resistors (Zbar, 1966, 1).

term	synonym
_____	_____

A footing for a pier, post, or a column should be square. Also it should have a pedestal -- a raised area on which the member will bear (Feirer & Hutchings, 1976, 232).

term	synonym
_____	_____

Illustrations

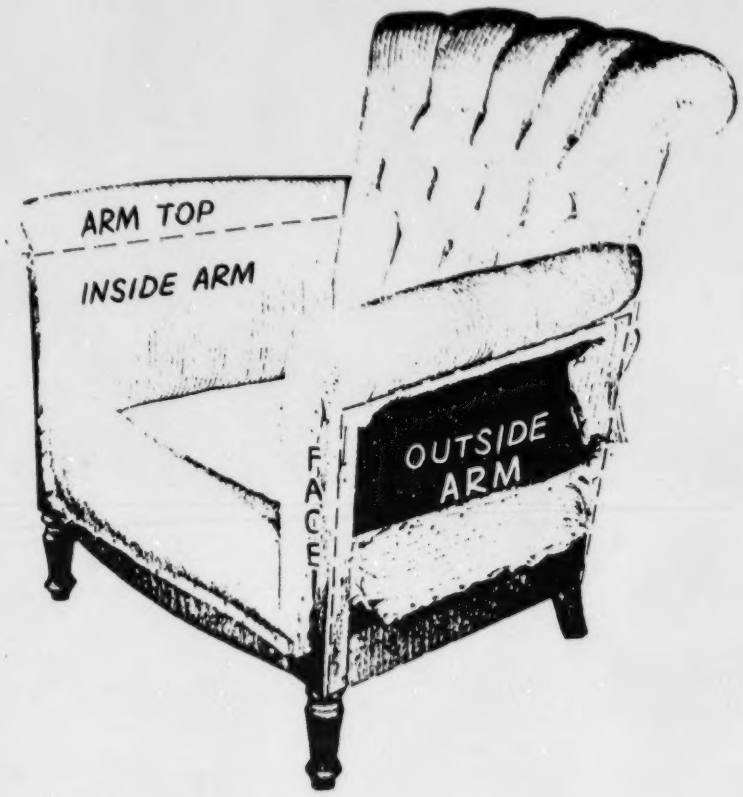
One of the most frequent types of definition in a vocational text is an illustration. Unfortunately, students often skip over the illustrations when they are reading. The first task of an instructor is to impress on students the need to immediately study the designated figure whenever it is mentioned in the prose (Ex: "See Fig. 8-2"). In Figures 14 and 15 those terms explained by an illustration are noted along with the page number of the prose and the diagram. Forcing students to physically note this information is a useful first step in teaching them to use diagrams as

Figure 14: Tool Illustration

Screwdrivers consist of three parts: the handle, the steel portion extending from the handle called the shank, and the end which fits into the head of the screw called the blade. (Lascoe, Nelson, and Porter, 1973, 51)

Pg. # terms	Pg. # Illus.	Terms
20	20	Blade, shank, handle

Figure 15: Upholstery Illustration



(Parker and Fornia, 1976, p. 290-1)

Basic types of upholstered arms are the armrest pad, covered armboard, and the so-called fully upholstered arm, most of which actually are fully upholstered. The last group also contains arms not fully upholstered, and arms that are continuations of inside backs, and of wings. Most fully upholstered arms have four upholstered parts, Fig. 8:00. (1) Arm face or front. It may be upholstered and covered as an extension of the inside arm; or, upholstered for and covered by a panel; or, built for a

Figure 15 (Continued)

border or a boxing. (2) Outside arm. This usually is very simple upholstery, done when installing outside covers. Outside arm upholstery and cover may be continuations of an inside arm, as for a rounded arm. (3) Armtop. Except for T-shaped arms, an armtop is a direct continuation of an inside arm and is treated as such. (4) Inside arm. This generally includes the armtop, even of T-shaped arms. An inside arm may or may not include part or all of an arm face.

(Parker and Fornia, 1976, 290-1)

comprehension aids. Later they will apply the visual definition to the prose automatically.

Glossaries

Many current vocational texts include glossaries at the end of the chapter or book. The teacher's task is to make sure the students use this aid. In the initial weeks of a course students can be required to read the glossary the night before beginning a new chapter. Initially, as they read the chapter and encounter a new word defined in the glossary they can note it on a separate piece of paper. While the notation is not important in itself, the requirement of writing it will face them to actively use the glossary. This requirement and the assigned previewing can be relaxed later in the term.

Exercise 7: Textbook Application

Select an introductory chapter from the vocational text you teach. Look for the basic vocabulary comprehension aids introduced above. Record them in the sections below.

Formal Definitions

	Pg. #	Term	Clue word	Definition
1				
2				
3				
4				

Synonyms

	Pg. #	Term	Clue word	Definition
1				
2				
3				
4				

Illustrations

	Pg. # term	Pg. # Ill.	Terms defined by the drawing or photograph
1			
2			
3			
4			

Glossary

Pg. #	Terms found in the glossary (use each term only once)
1	
2	
3	
4	
5	
6	

Teaching Students Basic Vocabulary Skills

The basic vocabulary skills can be introduced in the first week or week and a half of class. Every-other-day one skill can be explained and an example given. Three or four more examples can be given on a transparency, ditto, or the board while the class locates the term and definition in a discussion. As part of their regular homework assignment, have students practice these skills. Select five words that you know are explained by the skill taught that day (synonym, formal definition, etc.). Have students prepare a sheet similar to the one you completed in the preceeding text application section.

Exercise 8

The cloze teaching technique can also be used to reinforce or check the basic vocabulary skills. Prepare a clozed selection from your text, omiting important technical terms that are explained by one of the techniques discussed. This can be used to determine whether students use these comprehension aids or know the vocabulary. It can also be used to demonstrate to them the usefulness of learning these skills.

SECTION 4
ADVANCED CONTEXT CLUES

Section 4: Vocabulary II - Advanced Context Clues

Advanced context clues assist the reader in understanding a technical term but require more interpretation on the part of the student than the basic clues presented earlier. Advanced context clues include the use of explanations, examples, situations, antonyms, and the structural clues of prefixes, suffixes, and roots. Only the first two will be discussed here because of their greater utility in vocational reading.

Explanations

Sometimes an author makes the meaning of word clear, but doesn't actually define it. More frequently, a term is defined once early in the book, but will be used later without definition. Students may not remember the initial definition. Encourage them to skip a word they don't know, read the surrounding sentences and then make an educated guess as to its meaning.

> To help a welded joint stretch as it cools, a common practice is to peen it lightly with the round end of a ball peen hammer (Giachino and Weeks, 1976, 37).

From the rest of the sentence, it is clear that peening is something you do with a ball peen hammer. An educated guess would be the peening is a special kind of hammering. The following two passages discuss vapor. By reading both, a student should be able t, figure out that vapor is something that can flow but is not a liquid, and in fact is formed by the evaporation of a liquid.

Any liquid refrigerant that flows into the accumulator will be evaporated. Then vapor only will flow into the suction line (Althouse, Turnquist, Bracciano, 1975, 103).

The ammonia vapor flows up through (a) tube to the condensor, where it is cooled and condensed to a liquid. The liquid ammonia flows into the evaporator (Ibid, 91).

Examples

Authors also help convey the meaning of technical terms through the use of examples. By determining what a series of examples have in common, it is often possible to deduct the meaning of the term they exemplify. Certain clue words can signal the use of examples. These include: for example, for instance, like, specifically, including, such as, as.

The portable saw may be used to make cuts in assembled work. For example, flooring and roofing boards are often nailed into place and then the ends are trimmed (Wagner, 1979, 29).

Term	Example
Assembled work	Flooring and roofing boards nailed into place

Voltage drops. Just as the pressure in a water system drops as the distance increases from the water pump, so does the voltage lessen as the distance increases from the generator (Giachino and Weeks, 1976, 57).

Term	Example

89

Automatic humidification controls usually govern the flow of water or steam into a humidifier. If the air is too dry, additional moisture is provided (Althouse, Turnquist, Bracciano, 1975, 254).

Term(s) _____ Example _____

Exercise 9: Textbook Application

Select five instances when your course text used the context clues of explanation and example in the sections you would normally assign during the second and third week of class.

Explanation

	Pg. #	Term	Educated guess
1			
2			
3			
4			
5			

Example

Pg. #	Term	Examples

From the 4th week's reading assignment select two paragraphs that use at least two of the basic or advanced context clues and note them below.

	Pg. #	Term	Type of clue (synonym, example, etc.)
1			
2			
3			

Teaching Students to Use Advanced Context Clues

The use of advanced context clues is taught in the same manner as the use of basic vocabulary skills. Five to ten minutes on two days, say Monday and Wednesday, are spent presenting and discussing explanations. A few minutes on another day are used to help students understand and practice locating example context clues. Each night students are asked to find technical terms that are explained by the newly learned clue. You might tell them that X number of terms with the appropriate type of context clues can be found on a given page. Again, the cloze technique can be used as practice and a check on comprehension as it was in the basic vocabulary skills section.

Once all of the vocabulary skills have been mastered, the instructor should ditto sample paragraphs (such as those selected in the text application section) and ask the students to indicate the types of context clues used to define certain underlined terms.

SECTION 5
PARAGRAPH COMPREHENSION

Section 5: Paragraph Comprehension

A paragraph has three major components:

1) the subject (what is beling talked about)

2) the main idea (the most important information about the subject)

3) the supportive information (facts or examples that make the information clearer)

Of these, the main idea is the most crucial, for the key points of a chapter or article are simply selected main ideas from component paragraphs.

Look at the following paragraph about constructing forms for pouring concrete walls. What are the subject and the main idea?

> For quality work the (wall) form used must be tight, smooth, defect-free and properly aligned. Joints between boards or panels should be tight to prevent the loss of cement paste which will tend to weaken the cement and result in honeycombing. (Wagner, 1979, 99)

It looks as though the subject here is wall forms. However, it is not simply talking about wall forms, it is talking about what makes <u>good</u> ("quality") wall forms. If "good wall forms" is the subject, then the main idea should contain the most important information about good wall forms. That information is that they must be "tight, smooth, defect-free and properly aligned." The rest of the paragraph gives more information about why wall forms should be tight. This information is important, but since it elaborates on only one of the main points, it is considered supportive. The main idea, then, is "Good wall forms must be tight, smooth, defect-free, and properly aligned."

Paragraph Subject

The key to finding the subject of a paragraph is finding the one topic that everything else in the paragraph is related to. A paragraph usually discusses only one small aspect of a larger topic, therefore, the subject must not be too general. It must identify the specific topic being discussed. At the same time, it must not be too specific, substituting an example of the subject being discussed for the subject itself.

Read this next paragraph from an electricity text and look for its subject.

> The law of conservation of energy states that energy cannot be created or destroyed. However, energy can be converted from one form into another. Electric energy in the form of a flow of electrons can, for example, be converted into heat energy, light energy, chemical energy, or magnetic energy. (Buban and Schmitt, 1972,2)

subject: a) energy
b) conservation of energy
c) electric energy

Immediately, choices "a" and "c" can be eliminated. It can be seen that "a" is too general, since the paragraph only touches on one small aspect or energy. However, "c" is too specific; the paragraph simply discusses electric energy as an example of the conversion of energy from on form to another. It follows, then, that "b" is the correct answer.

Now examine this more complex paragraph.

When food is burned in your body, it produces the heat required to keep your body at a constant 98.6°F (36°C). In the burning of food, the process called metabolism, the energy produced is used for the body's activities. This does not mean just outside activities. Internal activities, such as the beating of your heart, the breathing action of your lungs, the digestion of your food, and even the working of your brain, need energy, too. All this is dependent on the food you eat. (Ray and Jones, 1976, 90)

subject: a) body heat
b) metabolism
c) body's internal activities
d) outside activities of the body
e) functions of matabolism

Applying the three criteria we find:

1) the subject must relate to everything in the paragraph
a, c, and d can be eliminated

2) the subject must not be too general
b can be eliminated (only one small aspect of metabolism is discussed)

3) the subject must not be too specific
again this means the elimination of a, c, and d

"E," therefore, is the correct choice. Find the subject in the following:

Exercise 10

Example: To secure a sound weld, the metal deposited from the electrode must fuse completely with the base metal. Fusion will result only when the base metal has been heated to a liquid state and the molten metal from the electrode readily flows into it. Thus, if the arc is too short, there will be insufficient spread of heat to from the correct size crater of molten metal. When the arc is too long, the heat is not centralized or intense enough to form the desired crater. (Giachino and Weeks, 1976, 90)

Subject _____

Example: Many motor-compressor units are designed to start under a low load (torque) condition, such as when the low-side and high-side pressures are equal (balanced). The equal pressures allow the compressor to start without pushing against a high pressure. The motor will, therefore, require less starting torque capillary tube systems have balanced pressures during the off cycle. (Althouse, Turnquist, Bracciano, 1975, 143)

Subject _____

Paragraph Main Idea

Often it is difficult to identify a paragraph's main idea. The following three guidelines can help in its location:

1. If the paragraph includes the definition of a term, that term might be part of the subject. The definition might be part of the main idea.

2. If there are examples, these may be illustrating all or part of the main idea.

3. If a key word or phrase is repeated, it might be part of the subject or main idea.

Note that the word "might" is used in each instance. These guidelines can point toward possible main ideas they cannot automatically select the right one.

Exercise 11

A. Look at the following three paragraphs. First ask yourself what the paragraph is about (the subject). Then look for the main idea using the three guidelines. Note which guideline is most helpful in each case.

Identifying the work is determining what needs to be done. Scheduling is determining when to do it. If work is not carefully scheduled, materials and workers will not be at the site when they are needed. For example, electrical wiring is installed after the frame is built but before the walls are enclosed. Without scheduling, the electricians might come to install the wiring before the frame is completed or after the walls are covered. Another example is painting. The inside of a building should be painted before carpeting is installed. Without scheduling, the carpet layers might come before the painters do. (Betts, et.al, 1976, 36)

Guideline #	Subject	Main Idea

When food is burned in your body, it produces heat required to keep your body at a constant 98.6°F (36°C). In the burning of food, the process called metabolism, the energy produced is used for the body's activities. Internal activities, such as the beating of your heart, the breathing action of your lungs, the digestion of your food, and even the working of your brain, need energy, too. All this is dependent on the food you eat. (Ray and Jones, 1976, 40)

Guideline #	Subject	Main Idea

> Grind refers to the finished shape of a knife edge . . . The knife may be ground so that it is concave, hollow, flat, or saber. Each grind has a particular use. (Ray and Jones, 1976, 94)

Guideline #	Subject	Main Idea

B. The following segment from a vocational text contains four paragraphs. On the next page space is provided for you to note the subject and main idea for each paragraph. If a paragraph contains no important information, ignore it.

> In Experiments 6 and 7 the uses of the ohmmeter and voltmeter for measuring resistance and voltage were studied. From the nature of the measurements, it was apparent that there were components called resistors whose resistance could be measured directly with an ohmmeter. The quantity of ohms of resistance was not dependent on the connection of that resistor in a circuit. The characteristic of resistance was associated with the component itself.
>
> Similarly, in the measurement of emf (electromotive force; i.e., voltage), it was evident that voltage was a characteristic of some voltage source (dry cell, battery, power supply, etc.), and that it could also exist independently without need for a complete electric circuit.
>
> Electric current differs from voltage and resistance in that it cannot exist by itself. A view of current is that it is the result of a movement of electric charges. A voltage source by itself is insufficient to create current. A voltage source and a closed (complete) path are required for the movement of these charges. The movement of electric charges, then, is restricted to the closed path (circuit) within which a voltage source can act.

The quantity of current in a circuit is dependent on the amount of voltage applied by the source of emf, and on the nature of the conductive path. If the path offers little opposition, the current is larger than it should be in a circuit where the opposition to current is greater. Opposition to direct current is called resistance. Resistance is measured in ohms. Current, then, can be controlled by the amount of resistance in the circuit. (Zbar, 1966, 28)

Subject	Main Idea

Exercise 12: Textbook Application

A. Pick four paragraphs from your fourth week's reading assignment. Identify the subject in each.

	Page #	Column #	Paragraph #	Subject
1				
2				
3				
4				

B. Pick four paragraphs from your fifth week's reading assignment identifying the subject and main idea in each.

	Page #	Col. #	Para. #	Subject	Main Idea
1					
2					
3					
4					

C. Pick a segment at least four paragraphs in length from your sixth week's reading assignment and note the subject and main idea of each important paragraph.

Page #	Subject	Main Idea
1		
2		
3		
4		

Teaching Students to Understand the Paragraph

Understanding the paragraph is the most difficult reading skill the vocational instructor must teach. It is important to introduce the material slowly and incrementally as was done here. The fourth week of class can be devoted to the paragraph subject. Monday five to ten minutes can be spent in a general introduction and discussion/practice locating subjects in simple sample paragraphs. Wednesday the three criteria can be applied to more sample paragraphs and students can look for the subject in

specified paragraphs from the homework reading. Friday a few of the homework paragraphs can be discussed and one or two more complex samples given. Friday's homework can include one to three more paragraph assignments.

During week six, a similar procedure can be utilized to teach locating the main idea. Each day one of the three clues can be introduced and applied along with the more general directions of "what is the most important thing the author is saying in this paragraph." The paragraphs you identified in the text application can be assigned to the students with directions to find the subject and main idea. In the sixth week the class can be assigned the multiparagraph sections you identified, recording the subject and main idea just as you did.

SECTION 6
EFFECTIVE READING TECHNIQUE

Section 6: Effective Reading Technique

In all subjects, the time comes when we ask our students to study by themselves. In many instances, these students do not know how to study. This section contains a brief overview and modification of a study technique originally devised by Francis Robinson.

The SQ4R Method of Study

Many elementary, secondary, and college students have not learned how to study a textbook assignment. A typical procedure is for the student to do nothing more than open his book and read the assignment. The more conscientious may follow this initial reading by a second or even a third reading of the same fruitless type. Research has found a good method of helping the student read a given selection with better understanding and better recall. It is called the SQ4R method. It involves six basic steps: (1) Survey, (2) Question, (3) Read, (4) Record, (5) Recite, (6) Review. Some of the things to be done in each of the six steps are discussed under appropriate headings below.

Survey:

> Look through the whole assignment. Read the headings if there are any; read the summary if there is one. Try to get the general idea of the content of the whole lesson. Later you can place the details into the framework which you have in mind, and the entire lesson will mean more.

Question:

Think of the questions which are likely to be answered in the lesson. Often the headings can very easily be turned into questions. Use them! If any heading does not tell you plainly what question is to be answered in that section use this question: "What does the author expect me to learn about from studying this section?" If there are no paragraph headings, skim the section quickly for the main ideas.

Read:

Study the lesson to find the answers to the questions. Do not stop to read every word carefully, concentrate on finding the main point. You cannot remember all the facts you find, so you want to look for the important ones, of which there will be only one or two for each section. Don't pick out too many. Do not try to memorize the facts at this point; just sort out the ones you need as you go along.

Record:

Make study guides. Fold or rule a large-sized notebook paper lengthwise down the middle. On the left, list the topics discussed in the book. If there are paragraph headings in boldface type, use them. If not, list the main ideas found in the preliminary survey. Leave space between topics. When you have finished reading a section and picking out the one or two points to remember, list on the right the key words of the ideas or facts you have decided are most important for each topic. Do not do this until after you have read a section and thought about it. This is most important.

Recite:

Go back over the lesson immediately. Cover the right hand side of the paper and check the headings on the left. Ask yourself, "Do I remember what this section was about?" or "Can I answer this question?" If you find that you cannot you know that you must look at the key words, or even go back to the book if necessary, in order to restudy the particular part which you did not understand or have forgotten. Step 4 is very important. Giving yourself an immediate quiz on what you have just studied is the best possible way to prevent forgetting.

> Practice until you can recite on the entire study guide without referring to the key words. Then practice some more. This extra practice is what really pays off.

Review:

> Some time later, and always before an exam, go back to your headings and questions and quiz yourself. Reread only those parts which you have forgotten. If you have taken steps 1, 2, 3, 4 and 5 faithfully, you will find that you do not have too much to restudy.

If students learn to change the heading within a chapter to questions and then read to answer those questions, much more will be obtained, than if they merely read and then answered questions at the end of the chapter. Indeed, what often takes place when we assign questions from the chapter ending is students read the questions and then copy only that information which answers the question without ever having read the chapter or designated pages. The process of formulating questions is a thinking exercise which tunes students into the assignment. Reading, studying, in this way is a life-long skill that really should be taught. As a skill, it may be more important than the content and concepts of the subject. (Robinson, 1970)

Exercise 13: Textbook Application

Select a portion of the chapter you assign in the seventh of eighth week of class and practice the SQ4R method.

Teaching SQ4R

Students have already learned how to locate the subject and main idea of a paragraph and how to distinguish these from information that is merely supportive. In the final "paragraph" assignments they practiced recording information in much the same manner as they will for SQ4R. This should facilitate SQ4R instruction. On Monday explain surveying and have the students practice in class on the chapter currently assigned. Wednesday have them prepare questions from some of the headings, either individually or as a group. They can continue this exercise for homework. Friday the read and record steps can be presented and compared with the subject/main idea work they have already done. Reading and recording can be practiced on the homework assignment and discussed the following Monday.

Teacher-made notes on the reading can be shown on a transparency, on the board, or a ditto to allow students to check their own notes. Wednesday the recite and review steps are introduced with students pairing-up to quiz each other from the left-hand subject column. Beginning Wednesday night, they should be expected to utilize the SQ4R method on their assignments. The next two Fridays, and sporadically thereafter, students can quiz each other on their notes while the instructor walks around the room noting whether each student has followed the correct procedure.

At the beginning of the next chapter, students should again be required to perform the survey step in class and suggest some guide questions derived from the chapter headings. Review of the other steps should take place as needed.

SECTION 7
RECOGNIZING AND RECORDING COMPLEX INFORMATION

Section 7: Recognizing and Recording Complex Information

Vocational texts often highlight three important logical relationships: classification, comparison, and causality. Classification, in its simplist form is simply listing.

> Inductors and transformers make up another classification of components. Wire-wound coils and chokes are classified as inductors. These are wound on different forms and cores. Thus, there are air-core coils, iron-core, powdered-coil, etc. (Zbar, 1966, 1).

Comparison and causality are straightforward and commonplace. Toyotas are compared with Volvos in one book while another discusses common problems that occur in baking bread, emphasizing their possible causes. These three relationships are easiest to see and remember if the notes taken about them a visual impact. Each of these charting techniques, as well as signal words that can alert the reader to such relationships are given below.

Classification

The use of classification can be signaled by a colon (:), number or letters, or words such as "these include." At other times classification is simply introduced by a statement: "there are a number of types of concrete." Outlining is the easiest way to record classification.

ELEMENTS OF DRAWING

> A drawing consists of lines, dimensions, symbols, and notes. Lines show the shape of a product and include many details of construction. Fig. 3-8. Dimensions are numbers that

tell the sizes of each part as well as overall sizes. The craftsman must follow these dimensions in making the materials list and the layout. Symbols are used to represent things that would be impractical to show by drawing, such as doors, windows, electrical circuits, and plumbing and heating equipment. Fig. 3-9. Some drawings also contain notes or written information to explain something not otherwise shown. Frequently in these notes abbreviations are given for common words (Feirer & Hutchings, 1976, 36).

Elements of a Drawing

A. Lines (shape and construction details)

B. Dimensions (sizes)

C. Symbols (represent complex things)

1. windows, doors, plumbing, etc.

D. Notes (written information and abbreviations)

More complicated classification can be presented with the use of a more detailed outline,

I. _____

A. _____

1. _____

a. _____

2. _____

a. _____

B. _____

Exercise 14

Construct such an outline of this selection for the following:

Structural Insulating Board

Most structural insulating board is made from wood fibers. It comes in two grades - sheathing and insulation.

There are two types of sheathing-grade insulation board. In one type all the surfaces and edges are covered with asphalt. In the other type the fibers are impregnated with asphalt during manufacture. These boards usually come in 4' x 8' sheets, 25/32" thick. They also come in 2' x 8' sheets. Sheathing grade is used for insulation and sound control as well as for structural sheathing.

Insulation grade is made in decorative panels, decorative ceiling tile, V-notched plaster base, and roof insulation. The standard thicknesses of this type of board are 1/2", 5/8", 3/4", or 1", although thicker boards up to 2" to 3" for roof insulation are also made. Sometimes thicker board is made by using an insulating board in the middle and a 1/4" hardboard on both surfaces. Ceiling tiles are made in a wide variety of sizes with tongue-and-groove edges, and with a choice of finishes. They are also made with a series of small holes to improve the sound control. Ceiling tile can be cemented, clipped, stapled, nailed, or interlocked in place. Acoustical tile absorbs up to seventy percent of the noise in a room. (Feirer and Hutchings, 1976, p. 103-4)

Comparison

While classification is commonly used in vocational texts, it is seldom used alone. Once the elements of a topic have been classified into sub-topics, these sub-topics are usually compared. Charts with the topics to be compared along one axis and the features of comparison along the other facilitate retention. The complete comparison section should be read before constructing the chart.

Desposition Classification of Electrodes

Electrodes for welding mild steel are sometimes classified as fast-freeze, fill-freeze, and fast-fill (See Table 6-3).

The fast-freeze electrodes are those which a snappy, deep penetrating arc and fast-freezing deposits. They are commonly called reverse polarity electrodes even though some can be used on AC. These electrodes have little slag and produce flat beads. They are widely used for all types of all-position welding for both fabrication and repair work.

Fill-freeze electrodes have a moderately forceful arc and deposit rate between those of the fast-freeze and fast-fill electrodes. They are commonly called straight-polarity electrodes even though they may be used on AC. These electrodes have complete slag coverage and weld beads with distinct, even ripples. They are the general-purpose electrode for production shop and are also widely used for repair work. They can be used in all positions, though the fast-freeze electrodes are preferred for vertical and overhead welding.

The fast-fill group includes the heavy coated, iron powder electrodes with soft arc and fast deposit rate. These electrodes have a heavy slag and produce exceptionally smooth weld beads. They are generally used for production welding where all work can be positioned for downhand (flat) welding (Giachino & Weeks, 1976, 76-77).

	Fast-freeze	Fill-freeze	Fast-fill
arc	snappy, deep-penetrating	moderately forceful	soft
deposit	fast-freezing	Moderate	fast
name	reverse-polarity electrode (can be used on AC)	straight-polarity electrode (can be used on AC)	heavy coated, non-powdered electrode
slag	little	complete slag coverage	heavy
beads	flat	distinct, even ripples	very smooth
use	all-positions, fabrication and repair (preferred overhead and vertical)	general purpose	production and downward (flat) welding

Exercise 15

Construct a chart for the following selection:

Types of Shapers

Horizontal Shapers. There are two types of horizontal shapers, the mechanical crank-type and the hydraulic type, which differ primarily in the method used to drive the ram. The parts and operating features described earlier are identical for both types. The drive mechanisms for each will be briefly discussed.

Crank-Type Shaper. The crank-type shaper, Figs. 1 and 2, takes its name from the mechanism used to reciprocate the ram. Fig. 5 shows the crank drive. In construction, the crank-operated shaper employs a crank mechanism to change rotary motion to reciprocating (back and forth) motion. A large gear, called a "bull wheel," receives its rotary motion from the electric motor through belts and a speed-box drive shaft.

Hydraulic Shaper. The hydraulic shaper, Fig. 6, is similar in outer construction to the crank-operated shaper. The main difference consists in the method used to move the ram.

Hydraulic pressure, as a means to drive the ram, is of great practical value. The principle is based on Pascal's law, which states that a fluid enclosed in, say, a pipe, will transmit, when pressure is applied, equal pressure in all directions and to all surfaces it touches.

In the hydraulic shaper, the ram is moved back and forth by a piston moving in a cylinder under the ram. The flow of oil from a high-pressure pump acting against first one side of the piston and then the other moves the ram. This flow of oil gives a positive drive to the ram. There is no chance of backlash, as there is with a gear drive. A wider range of cutting speeds and feeds is possible with the hydraulic type of shaper than with the mechanical shaper.

Vertical Shaper. The vertical shaper, or slotter, Fig. 7, has an operating mechanism similar in principle to that used on crank shapers. The important difference between this machine and the horizontal shaper is the vertical ram. The construction of the table is quite different too.

> The vertical shaper is used in cutting internal slots and keyways of various shapes, and both external and internal gears. It is also used to cut intricate patterns in die work. The jobs that can be done on this machine are like those done on the standard shaper, but the vertical shaper performs them in a number of different ways. Vertical shapers are of three types: crank-driven, rack-driven, and screw-driven.
>
> The rotary table on the vertical shaper can be fed in two directions as well as rotated. The flexibility of the rotary motion, together with the two-way horizontal feeding of the table, makes the vertical shaper a valuable tool for cutting keyways, slotting, and internal work. The ram may be tilted to give inside clearance for die work. (Lascoe, Nelson and Porter, 1973, 261-4)

Cause and Effect

Vocational texts often seek to teach students to diagnose and correct common problems in their trade. Such discussions are generally written in a cause and effect format. Again, a chart facilitates note-taking. In this case, causes are listed in one column opposite possible effects. The order of the columns is unimportant.

> Correct arc length. The significance of arc length was briefly mentioned in Chapter 7. Since it is one of the essentials for good welding, further amplification of correct arc length is included here. If the arc is too long, the metal melts off the electrode in large globules which wobble from side to side as the arc wavers. This produces a wide, spattered, and irregular bead without sufficient fusion between the original metal and the deposited metal. An arc that is too short fails to generate enough heat to melt the base metal properly. Furthermore, the electrode sticks frequently, producing a high, uneven bead with irregular ripples (Giachino and Weeks, 1976, 87).

Correct Arc Length

Arc length	Problem	Effect
too long	electrode melts in large globs that wobble	wide, spattered, irregular bead/ poor fusion
too short	not enough heat to melt base metal/electrode sticks	high, uneven bead with irregular ripples

Exercise 16

Construct a similar chart for this information on lumber defects:

Lumber Defects

A defect is an irregularity occurring in or on wood that reduces its strength, durability or usefulness. It may or may not detract from appearance. For example, knots commonly considered a defect may add to the appearance of pine paneling. An imperfection that impairs only the appearance of wood is called a blemish. Some of the common defects include:

KNOTS: Caused by an imbedded branch or limb of the tree, Fig. 4-14. They are generally considered to be strength reducing - the amount depending upon the type, size and location, See Fig. 4-15.

SPLITS and CHECKS: A separation of the wood fibers along the grain and across the annular growth rings. Usually occurs at the ends of lumber - a result of uneven seasoning.

SHAKES: A separation along the grain and between the annular growth rings. Likely to occur only in species with abrupt change from spring to summer growth.

PITCH POCKETS: Internal cavities that contain or have contained pitch in either solid or liquid form.

HONEYCOMBING: Separation of the wood fibers in the interior section of the tree. May not be visible on the surfact of boards.

WANE: The presence of bark or the absence of wood along the edge of the board. It forms a bevel and reduces the width.

BLUE STAIN: A discoloration caused by mold-like fungi. Objectional in appearance in some grades of lumber but has little or no effect on strength.

DECAY: A disintegration of wood fibers due to fungi. Early stages of decay may be difficult to recognize. Advanced stages result in wood that is soft, spongy, and crumbles easily.

HOLES: Holes in lumber will lower the grade. They may be caused by handling equipment or by wood boring insects or worms.

WARP: Any variation from true or plane surface. May include any one or combination of the following: cup, bow, crook, and twist (also called wind). See Fig. 4-16. (Wagner, 1979, pp. 57-8)

Exercise 17: Textbook Application

Select three paragraphs or sections from the text assignments for weeks nine, ten or eleven that include each of the logical relationships discussed above and complete a note chart on them.

Classification

1. Pg. #

Exercise 17 (Continued)

2.

3.

Comparison

1. Pg. #

2.

123

Exercise 17 (Continued)

3.

Cause and Effect

1. Pg. #

2.

3.

Teaching Students to Recognize and Record Complex Information

Chart notetaking as demonstrated here can be introduced anytime after week six, whenever it is appropriate for your text. The three types of charts need not be presented at the same time. For convenience sake, it is assumed here that all will be introduced during weeks nine, ten, or eleven. Each form should be presented on a separate day. One or two sample paragraphs or sections can be given and the students can construct the charts as a class. Related homework assignments should be given as soon as the appropriate text selections are covered.

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